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(56) Documents Cited

WO 93/16833 A

US 4809793 A

(58) Field of Search

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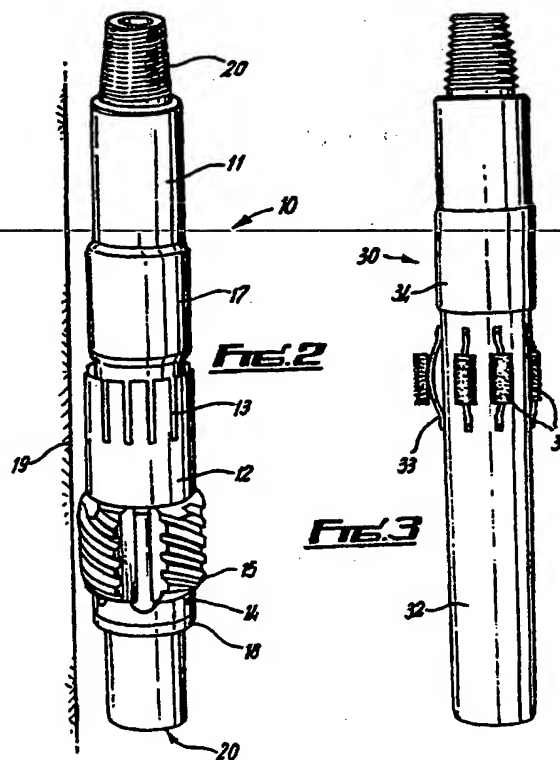
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(54) Abstract Title

Apparatus with retractable cleaning members

(57) Apparatus for cleaning the inside walls of a pipeline, well casing 19 or other tubing, comprises a supporting structure upon which are supported one or more cleaning members 15 and retraction means for controllably retracting the cleaning members 15 so as to avoid their contact with the aforesaid tubing when desired. The apparatus is also provided with a slidable and expandable sleeve 12 to effect contact between the retractable cleaning members 15 and the pipeline, well casing 19 or other tubing. The cleaning members 15 can be either brushes 31 or scraping blades and can be controlled by either mechanical or hydraulic means. The cleaning members can also be supported by one or more cleaning pads.



At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

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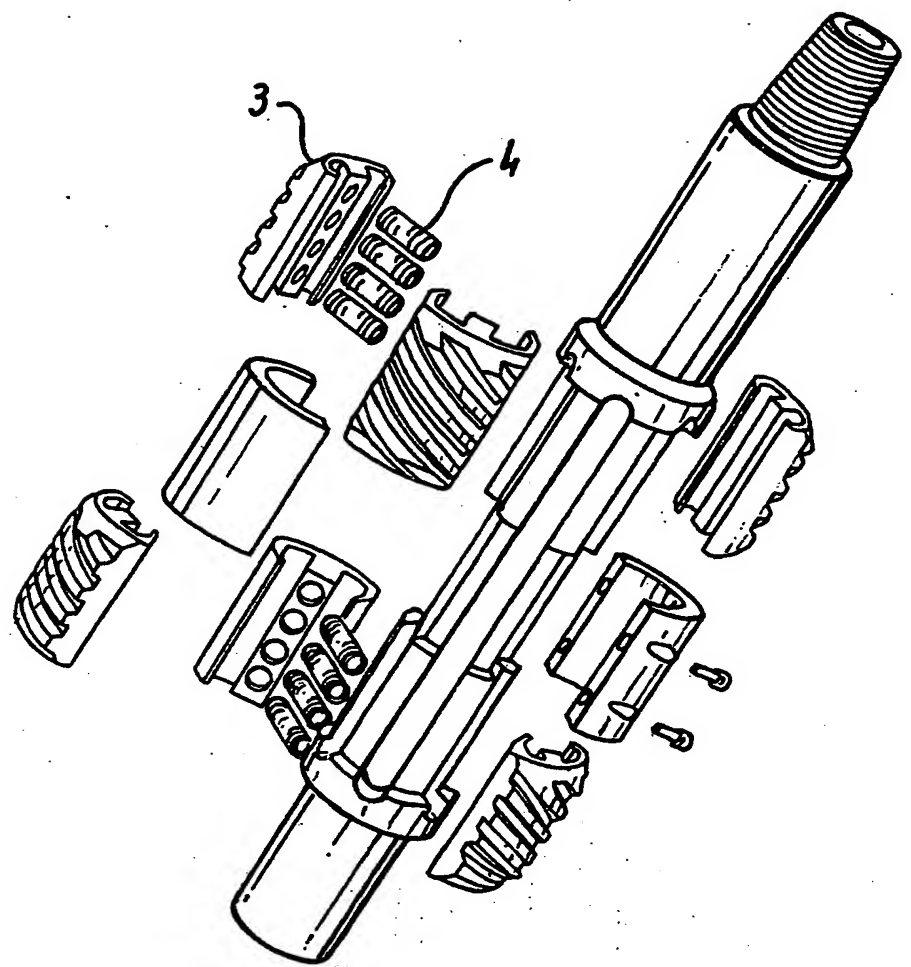
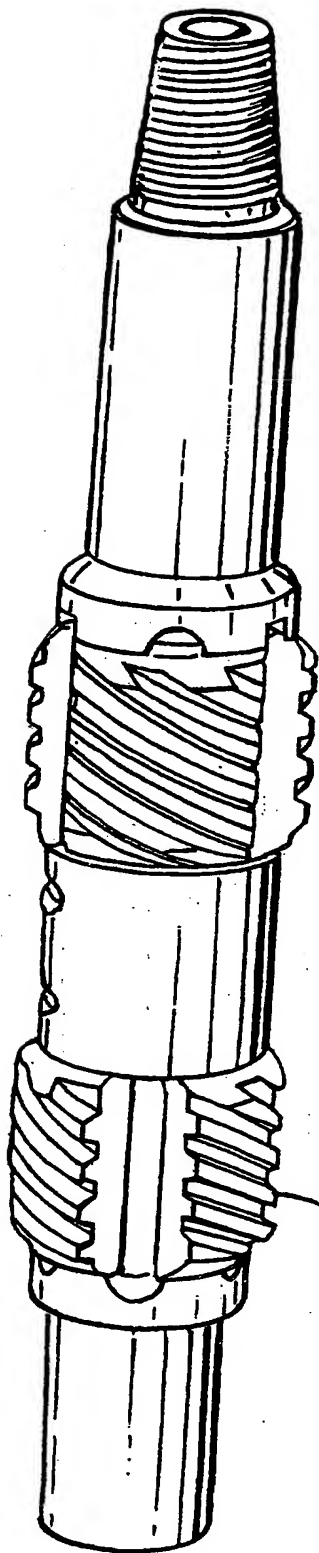
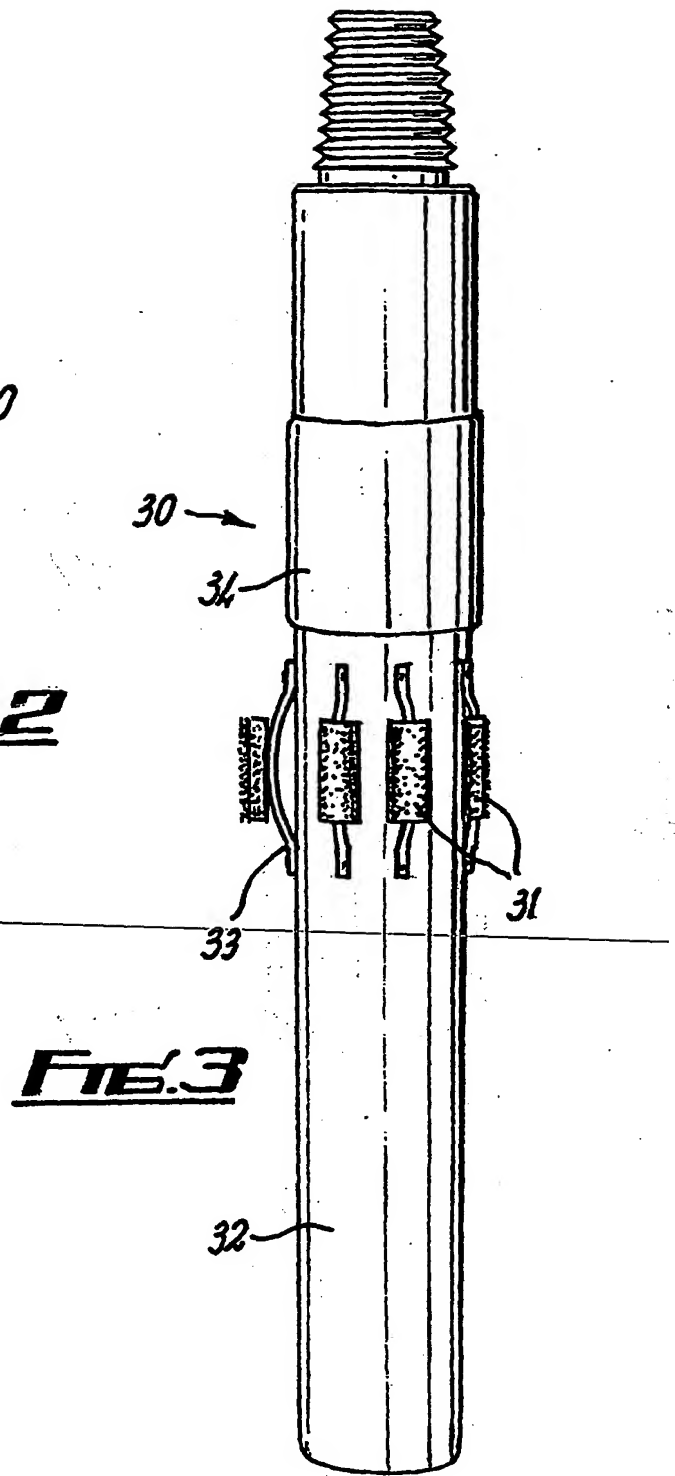
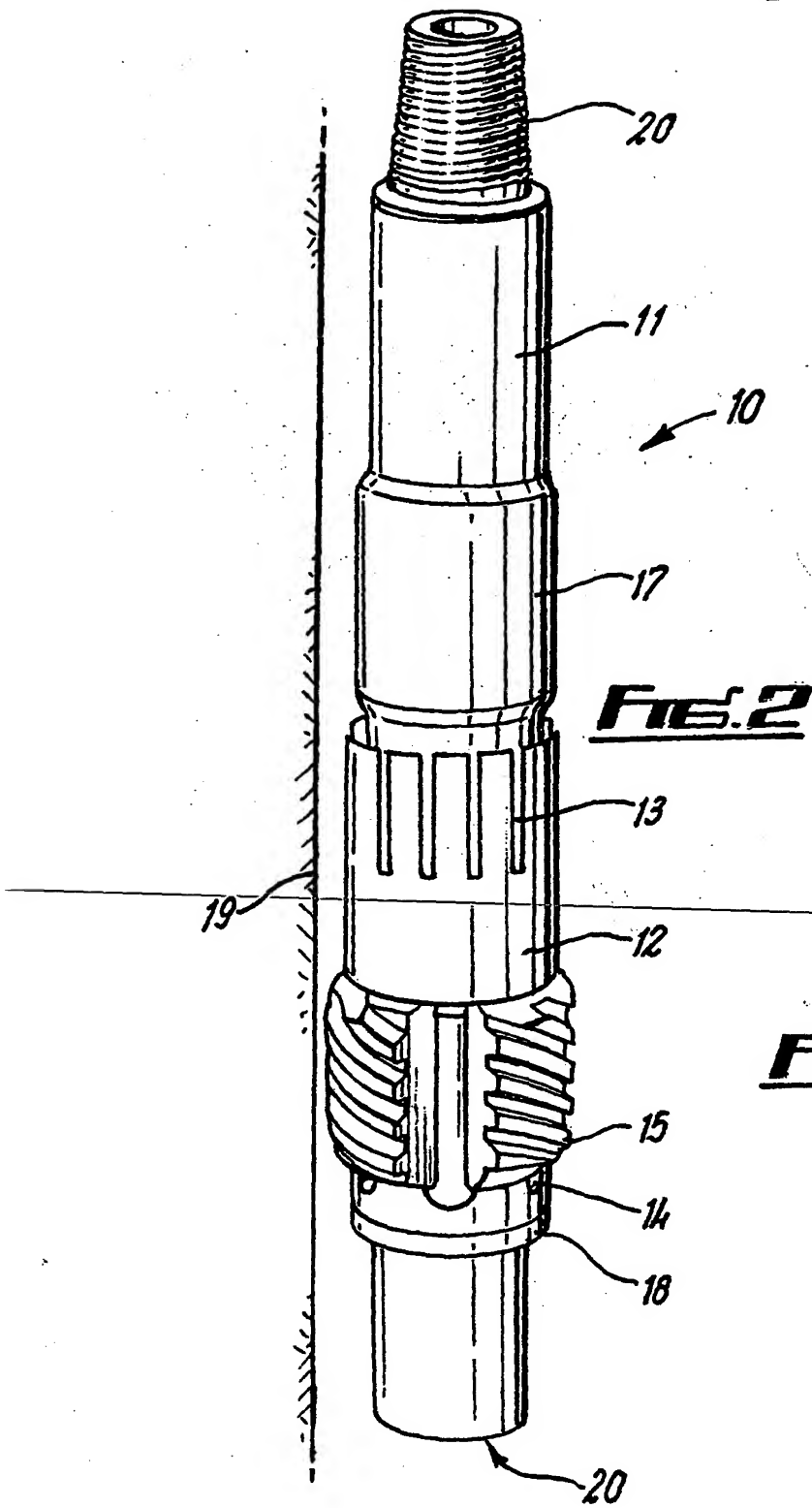


FIG. 1
(Prior Art)



1 APPARATUS WITH RETRACTABLE CLEANING MEMBERS
2

3 This invention relates to well cleaning apparatus and,
4 more generally, to apparatus used for the cleaning of the
5 insides of pipes, tubes, liners and the like.
6

7 It is considered desirable when drilling for oil or gas
8 to maintain a clean interior in the casing or liner of
9 the drilling well. For this purpose, well cleaning
10 apparatus is well known and comes in a variety of
11 different forms. One such type of well cleaning
12 apparatus is a casing scraper. This type of tool
13 typically incorporates steel casing scraper blades that
14 scrape the inside of the casing or tubing in the well.
15 The steel blades provided with casing scrapers usually
16 are designed to clean the casing interior of relatively
17 large particles or debris, such as lumps of cement, rocks
18 or congealed mud and so on.
19

20 Examples of casing scrapers can be seen from the prior
21 art drawing attached hereto.
22

23 A second type of well cleaning apparatus known in the art
24 may be more accurately likened to a brush and

1 incorporates cleaning pads with protruding bristles. In
2 British Patent Application Number 2 299 599 there is
3 described well cleaning apparatus which has a body member
4 to which is attached, preferably, a plurality of cleaning
5 pads spaced circumferentially around the body member.
6 The pads are provided with bristles on their outer face
7 and are biased outwardly by coil springs or similar means
8 in an attempt to maintain a sufficient contact pressure
9 of the bristles on the interior wall of the casing.

10
11 Brushing tools are generally used to clean well casings,
12 tubing and the like of smaller debris and or particles
13 than that of scraper tools. Sometimes brushing tools
14 will be used after a scraping tool has been run. Brushing
15 tools may be used to remove oxidation lumps, scale and
16 burrs for example.

17
18 A yet further type of well cleanup tool is generally
19 known as a circulation tool. An example of such may be
20 seen in our British Patent Number GB 2 272 923. The tool
21 is generally tubular and has two outlets at separated

22 axial positions to enable circulation of fluids to
23 separate regions in a borehole. The drilling fluid may
24 then be filtered and processed to further clean the well.

25
26 The existence of these and other well cleanup tools
27 demonstrates the importance of creating a clean well,
28 free of undesirable debris or other matter or pollutants.

29
30 However, in the present invention it is recognised that
31 during the extraction of known cleanup tools from the
32 well, additional debris can be dislodged, such as from
33 the wall of the casing, thereby negating much of the
34 cleaning work already performed. In fact, the

1 dislodgement of debris or particles during the extraction
2 of the tool can render futile the processes of filtering
3 and fine-screening that may have gone before. This
4 problem is particularly prevalent as such cleanup tools,
5 known to the art, have their cleaning members biased
6 outwardly to ensure adequate pressure of the cleaning
7 members on the walls of the casing or liner. While this
8 is of assistance during the cleaning process, it is a
9 disadvantage during the extraction of the tool from the
10 well.

11
12 An object of the present invention is to obviate or at
13 least mitigate this problem associated with known clean
14 up tools and their use.

15
16 According to the present invention there is provided
17 apparatus for cleaning the inside walls of a pipeline,
18 well casing or other tubing, comprising a supporting
19 structure upon which are supported one or more cleaning
20 members, wherein the apparatus further comprises
21 retraction means for controllably retracting the cleaning
22 members so as to avoid their contact with the aforesaid
23 tubing when desired.

24
25 Typically, the apparatus is a well cleanup tool and the
26 cleaning members are brushes or scraping blades.

27
28 The supporting structure may comprise a generally
29 elongated body member attachable to a work string or the
30 like. It may include one or more cleaning pads supporting
31 the cleaning members.

32

1 The retraction means may involve the relative axial
2 movement of two elements or portions of the apparatus by
3 mechanical or hydraulic means.

4

5 More particularly, the retraction means may comprise an
6 expandable split sleeve moveable between a first position
7 on the supporting structure and a second position on the
8 supporting structure, wherein the one or more cleaning
9 members are connected to the sleeve, wherein also a
10 shoulder is provided on the supporting structure at the
11 second position which serves to radially expand the
12 sleeve when the sleeve is located thereon such that the
13 one or more cleaning members, in use, contact the tubing,
14 and wherein the sleeve is not so expanded when in the
15 first position such that the one or more cleaning members
16 do not contact the tubing.

17

18 Hydraulic or mechanical means may be provided to
19 controllably move the sleeve from the first position to
20 the second position and from the second position to the
21 first position.

22

23 Alternatively, the supporting structure and shoulder
24 thereon may be moveable relative to the sleeve during the
25 picking up of the tool. Preferably, this would cause the
26 sleeve to move from the second position to the first
27 position.

28

29 Locking means may be provided for locking the sleeve in
30 the first or second position. More generally, locking
31 means may be provided for locking the one or more
32 cleaning members in a retracted or radially expanded
33 state.

34

1 In order to provide a better understanding of the
2 invention, an embodiment thereof will now be described,
3 by way of example only, and with reference to the
4 accompanying Figures, in which:

5

6 Figure 1 shows a casing scraper forming prior art;

7

8 Figure 2 illustrates a well cleanup tool having
9 retractable cleaning members in accordance with the
10 invention; and

11

12 Figure 3 shows an alternative tool, also having
13 retractable cleaning members.

14

15 Referring firstly to Figure 1, two representations of a
16 known well cleanup tool are shown. The tool 1 is
17 designed as a casing scraper and includes scraper blades
18 3 that are biased in an outward or radial direction by
19 the springs 4. In use, the blades 3 are maintained in
20 contact with a casing wall in a downhole well or
21 environment.

22

23 In Figure 2 an alternative tool is depicted and generally
24 described at 10. The tool 10 comprises a substantially
25 cylindrical and elongate supporting structure or body 11
26 having means 20 at each end for attachment to a drill
27 string. Upon the supporting structure 11 is slideably
28 mounted a sleeve 12. The sleeve 12 is expandable by
29 reason of longitudinal slits 13 located along part of its
30 length.

31

32 A plurality of cleaning pads 14 are detachably fixed to
33 the sleeve 12, the pads 14 supporting cleaning members in
34 the form of blades 15. Coil springs (not shown) are

1 located behind or internally of the pads 14 to bias the
2 pads 14 and consequently the cleaning members 15 in an
3 outward and radial direction.

4

5 The supporting structure 11 is provided with a shoulder
6 17 having an increased outside diameter. The shoulder 17
7 is located at what is referred to herein as the second
8 position.

9

10 In Figure 2, the sleeve 12 is located at the first
11 position and abuts bearings 18. The bearing 18 provides a
12 shoulder on the supporting structure 11, preventing
13 movement of the sleeve 12 further down the tool or drill
14 string.

15

16 When the sleeve 12 is in the first position the blades 15
17 are close to but do not quite reach or contact the casing
18 wall 19 (shown in half section). Thus, any springs or
19 other biasing means which bias the cleaning members 15 in
20 an outward radial direction are limited in that they do
21 not allow for sufficient radial extension of the cleaning

22 members 15 to contact the wall 19 while the sleeve 12 is
23 in the first position.

24

25 In the embodiment hydraulic means may be employed to
26 cause upward or axial movement of the sleeve 12 relative
27 to the supporting structure 11. This movement of the
28 sleeve 12 causes it to straddle the shoulder 17 and
29 consequently expand outwardly, causing the scraper blades
30 15 to come into contact with the wall 19.

31

32 In an alternative embodiment the sleeve 12 could be
33 mechanically or hydraulically locked in the first or
34 second position during, for example, a specific

1 operation. For example, a J-slot mechanism, well known
2 to the art, could be used to fix the sleeve in a desired
3 position.

4
5 In Figure 3, a tool 30 has brushes 31 mounted on a
6 supporting structure 32 by leaf springs 33. The springs
7 33 bias the brushes in an outward and radial direction,
8 such that in normal use they extend radially to contact
9 the inside wall of tubing or pipework in which the tool
10 30 is located.

11
12 Again slideably mounted on the supporting structure 32 is
13 a sleeve 34. The sleeve is sized such that it may at
14 least partially envelope and compress the springs 33 so
15 as to cause the brushes 31 to retract until they no
16 longer contact the tubing wall.

17
18 A distinguishing feature between the embodiments of
19 Figure 2 and Figure 3 is that the sleeve in this latter
20 described embodiment is not itself expandable or
21 retractable, and nor does it support the cleaning
22 members.

23
24 The advantage of the tools or apparatus described is that
25 the cleaning members can be raised or lowered in the well
26 without scraping or brushing the casing wall, if desired.

27
28 While well cleanup tools have been described by way of
29 example, it should be understood that the present
30 invention is not limited to such tools or such
31 applications. For example, the invention could be
32 applied to pipeline pigs. Moreover, the invention could
33 be applied to drilling tools other than well cleanup
34 tools, in situations where it may be desired to withdraw

1 a tool or sub from a well without it scraping against or
2 interfering with the well liner or casing or packers or
3 the like engaged with such.

4

5 Further modifications and improvements may be
6 incorporated without departing from the scope of the
7 invention herein intended.

1 Claims:

2

3 1. Apparatus for cleaning the inside walls of a pipeline,
4 well casing or other tubing, comprising a supporting
5 structure upon which are supported one or more cleaning
6 members, wherein the apparatus further comprises
7 retraction means for controllably retracting the
8 cleaning members so as to avoid their contact with the
9 aforesaid tubing when desired.

10

11 2. Apparatus as claimed in Claim 1 wherein the apparatus
12 is a well cleanup tool and the cleaning members are
13 brushes or scraping blades.

14

15 3. Apparatus as claimed either Claim 1 or 2 wherein the
16 supporting structure comprises a generally elongated
17 body member attachable to a work string or the like,
18 and includes one or more cleaning pads supporting the
19 cleaning members.

20

21 4. Apparatus as claimed in any of the preceding Claims
22 wherein the retraction means involves the relative
23 axial movement of two elements or portions of the
24 apparatus by mechanical or hydraulic means.

25

26 5. Apparatus as claimed in any of the preceding Claims
27 wherein the retraction means comprises an expandable
28 split sleeve moveable between a first position on the
29 supporting structure and a second position on the
30 supporting structure, wherein the one or more cleaning
31 members are connected to the sleeve, wherein also a
32 shoulder is provided on the supporting structure at the
33 second position which serves to radially expand the
34 sleeve when the sleeve is located thereon such that the

1 one or more cleaning members, in use, contact the
2 tubing, and wherein the sleeve is not so expanded when
3 in the first position such that the one or more
4 cleaning members do not contact the tubing.

5
6 6. Apparatus as claimed in Claim 5 wherein hydraulic or
7 mechanical means are be provided to controllably move
8 the sleeve from the first position to the second
9 position and from the second position to the first
10 position.

11
12 7. Apparatus as claimed in Claims 5 or 6 wherein the
13 supporting structure and shoulder thereon are moveable
14 relative to the sleeve during the picking up of the
15 tool; this would cause the sleeve to move from the
16 second position to the first position.

17
18 8. Apparatus as claimed in Claims 5-7 wherein locking
19 means are provided for locking the sleeve in the first
20 or second position.

21
~~22 Apparatus as claimed in Claim 8 wherein the locking means~~
23 are provided for locking the one or more cleaning members
24 in a retracted or radially expanded state.



Application No: GB 9913751.5
Claims searched: 1 - 9

Examiner: Andrew P Jenner
Date of search: 29 July 1999

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.Q): E1F: FLC

Int Cl (Ed.6): E21B: 37/00, 37/02

Other: EPODOC, World Patents Index, JAPIO

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	WO93/16833 A PECO MACHINE SHOP ET AL - see figures	1
X	US 4809793 A HAILEY - whole document relevant	1 - 2, 4

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.